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CR Series of Universal Testing Machines Specification Sheets

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Specifications for the following Models:

CR-100KN (100 kN / 22,000 lb Capacity)
CR-200KN (200 kN / 44,000 lb Capacity)
CR-300KN (300 kN / 65,000 lb Capacity)
CR-500KN (500 kN / 115,000 lb Capacity)
CR-900KN (900 kN / 200,000 lb Capacity)

1.0 General Description of the CR Series of Testing Machines

The testing machines in the CR Series are of a very rugged floor mounted design for testing in tensile, compression, or creep and are available in capacities from 100 kN (22,000 lb) up to 900 kN (200,000 lb). The CR Series design consists of a single ball screw driven mechanical loading actuator which protrudes from the platen of the testing machine. The ball screw is driven by a gear box coupled to a DC servo electric motor operating in closed loop control for accurate speed control. The easy to learn Model TC-100 software is used for performing tensile and compression tests. The rugged design features of the CR Series makes these machines ideally suited for a wide variety of applications in both Quality Control and Research and Development testing of products and components. Software packages are also available for performing creep tests and low cyclic rate fatigue testing. In addition, modifications to the software packages and the standard machine designs are available for special applications. The CR Series machines are also available in a CRT version for applications requiring tensile/compression and torsion testing capabilities. Please contact ATM for more information.

Figure 1 is an overall view of a 300 kN (65,000 lb) capacity CR-300KN and the computer system used for control and data acquisition. Figure 2 shows an overall view of a typical setup of the Electronics Control Box and the PC based computer system required for operation. The Electronics Control box located next to the computer contains the motor control power supply and the amplifier system for excitation and amplification of the transducers used with the testing machine. The diagram and table in Figure 3 shows the major dimensions and part locations of the CR Series machines.

2.0 Mechanical Specifications

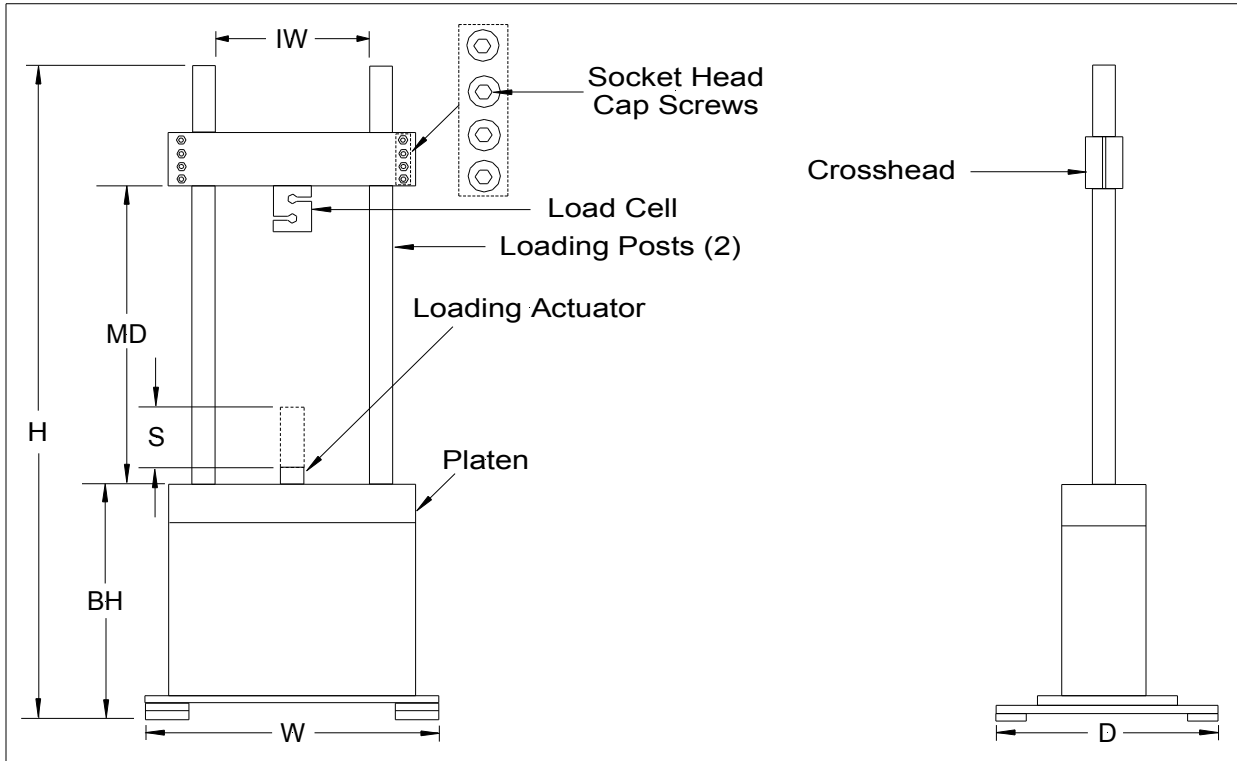
1. Test Speeds and Ranges (at rated capacity):
 - For sizes up to CR-300KN: 0.005 - 125 mm / min
(0.0002 - 5.0 in / min)
 - CR-500KN and CR-900KN: 0.005 - 100 mm / min
(0.0002 - 4.0 in / min)
2. 200 mm (8 in) maximum stroke length
3. The loading mechanism consists of a loading actuator which protrudes from the test machine platen. It is driven by a ball screw/ball nut combination. The ball screw mechanically couples to a DC servo motor.
4. The drive motor is a DC servo motor with a shaft mounted encoder. The encoder is used for both crosshead position calculation and speed control. Limit switches with adjustable stops are used to prevent overshoot of the actuator at both upper and lower stroke positions.
5. The crosshead is adjustable in height over a wide vertical range on the solid chrome plated steel loading posts. To reposition the crosshead, the socket head cap screws which compress the crosshead onto the loading



Figure 1
Overall View of Model CR-300KN with
Electronics Control Box and Computer System



Figure 2
Electronics Control Box and Computer System



DESCRIPTION	Model Number				
	CR-100KN	CR-200KN	CR-300KN	CR-500KN	CR-900KN
Load Capacity, kN	100	200	300	500	900
lb	22,000	44,000	65,000	115,000	200,000
Overall Height, H	239 (94)	239 (94)	252 (99)	259 (102)	284 (112)
Max. Cr. Hd. to Platen, MD	117 (46)	114 (45)	117 (46)	109 (43)	125 (49)
Base Height, BH	107 (42)	107 (42)	114 (45)	127 (50)	137 (54)
Maximum Width, W	91 (36)	91 (36)	91 (36)	102 (40)	117 (46)
Inner Working Width, IW	40.6 (16)	45.7 (18)	50.8 (20)	55.9 (22)	61 (24)
Maximum Depth, D	81 (32)	86 (34)	86 (34)	91 (36)	102 (40)
Stroke Length	----- 20 (8) -----				
Test Speed Range	-----				
at rated Capacity, mm/min	----- 0.005 - 125 -----			----- 0.005 - 100 -----	
in/min	----- 0.0002 - 5.0 -----			----- 0.0002 - 4.0 -----	
Machine Stiffness, (at 50 cm / 20 in crosshead height	-----				
kN/mm	150	250	400	600	1200
*1000 lb/in	1000	1600	2600	3900	7800
Machine Mass, kg	480	820	1180	1365	2600
Weight, lb	1050	1800	2600	3000	5700

Note:

1. Dimensions in Table are given in cm (in)
2. Machine Mass/Weight values do not include actuator bellows cover, safety doors, or other options.
3. Specifications and Dimensions are Subject to Change without Notice

Figure 3
CR Series Tensile/Compression Testing Machines
Major Dimensions and Parts Locations

posts are loosened and the crosshead is then free to be moved to a new location. The loading actuator, with suitable spacers, may be used to adjust the crosshead to the required position after the cap screws are loosened.

6. Standard Load Cell: Full Wheatstone bridge type rated for testing system capacity in tension and compression. Lower capacity load cells are also available to expand the accuracy of testing to low load levels.
7. Power Requirements: 110 - 120 VAC, 60 Hz, 1 phase or
220 - 240 VAC, 50 Hz, 1 phase
Other voltages are also available.

Specifications are Subject to Change without Notice

3.0 Computer Requirements and Motor Control System

The CR Series machines require an IBM compatible Pentium type PC system with a color display, hard drive, R/W CD or DVD drive, and a Windows compatible printer for printing test reports. One unused PCI slot must be available on the PC for the servo controller / data acquisition card. The ATM software requires Microsoft Windows2000 or the WindowsXP operating system. The motor control and data acquisition hardware consists of the PCI card and an Electronics Control box containing the motor power supply, servo amplifier, and a combined DC and AC conditioners system. The PCI card features include a combination of 12 bits resolution A/D channels and 2 channel servo motor controller capability. A 16 bits A/D resolution is available as an Option. The PCI card uses the encoder feedback signal from the actuator motor and software commands to produce the motor control system command signal for the actuator motor. The motor control system consists of a DC power supply for powering the DC servo motors and DC servo amplifier for amplification of the servo controller card command signal.

Note: A 4 channel DC conditioner board is available as an option with the system as a substitute for the standard 2 channel AC / 2 channel DC conditioner board. The 4 channel DC conditioner board is recommended for systems that require additional lower capacity load cells and extensometers for the tests to be performed on the system.

Two selector switches mounted on the front panel of the Electronics Control Box as shown in Figure 4 are used for Manual Control positioning of the actuator. The actuator is moved up or down using the left spring loaded Down/Up selector switch. The Slow/Fast right selector switch is used to select the speed of the manual positioning motion. The speeds corresponding to the Slow and Fast positions are set from within the software. Two DC and two AC conditioners are provided in the base of the testing machine on a single circuit board. All of the input connections from the rear panel and front mounted Manual Control switches are made to this board through connectors. The DC conditioners can be used for excitation and amplification of the ATM line of full Wheatstone bridge type



Figure 4
Electronics Control Box Front Panel

load cells. The AC conditioners are used for excitation and amplification of LVDT type devices including certain types of extensometers and other position feedback transducers. Provision is made on the Electronics Control box rear panel for monitoring the conditioner output signals through female type BNC connectors. The 15 turn potentiometers accessible through a slot in the right side panel are used for the 2 DC conditioners for electrical adjustment of the Gain, Input Offset (In OS), and Output Offset (Out OS) adjust. The AC conditioners have potentiometers for adjustment of the + Offset (+OS), - Offset (-OS), and Gain. In addition, the DC conditioners have a push button Calibration Check (Cal Chk) switch for a quick check of correct DC conditioner calibration. In a typical setup, the DC conditioner 1 is used with the standard capacity load cell and DC conditioner 2 is used for a Full Wheatstone bridge type extensometer or lower capacity rated load cell.

4.0 Data Acquisition System

Data acquisition for the standard system utilizes the 12 bit A/D channels on the PCI data acquisition / controller card. The connector marked Servo on the rear panel of the base of the machine is used to make the cable connection between the machine and the computer system.

The A/D input range is set at +/-10 VDC. For the standard system, the I/O connector on the base rear panel is not used but is available for use in special applications. The AC and DC conditioner connections are made internally in the control box and are connected to the PCI card through the Servo connector. In addition, other connectors may have been mounted on the rear panel for input of other transducer signals in the particular system.

5.0 Computer Software Description

The TC-100 Tensile/Compression software package is the standard package included with a CR Series machine. The software features a user friendly environment to perform the tasks necessary to run the system. The various features are available through use of the computer keyboard Function keys or clicking on the associated boxes. A brief description of the software is given as follows.

The Main Screen of the TC-100 software is shown in Figure 5. When the software is started, the data set and test parameters which are displayed on the X-Y graph are those which were current at the previous software shutdown. This data set and test parameters are stored in the TESTBAK.000 file. The present Tensile/Compressive and Yield Strengths for the data set are displayed in the Present Data box in the upper left hand screen.

Note: The Yield Strength will only be shown if the test was performed with an extensometer or actuator position on the horizontal axis which is required to calculate the strain or the elongation in the specimen.

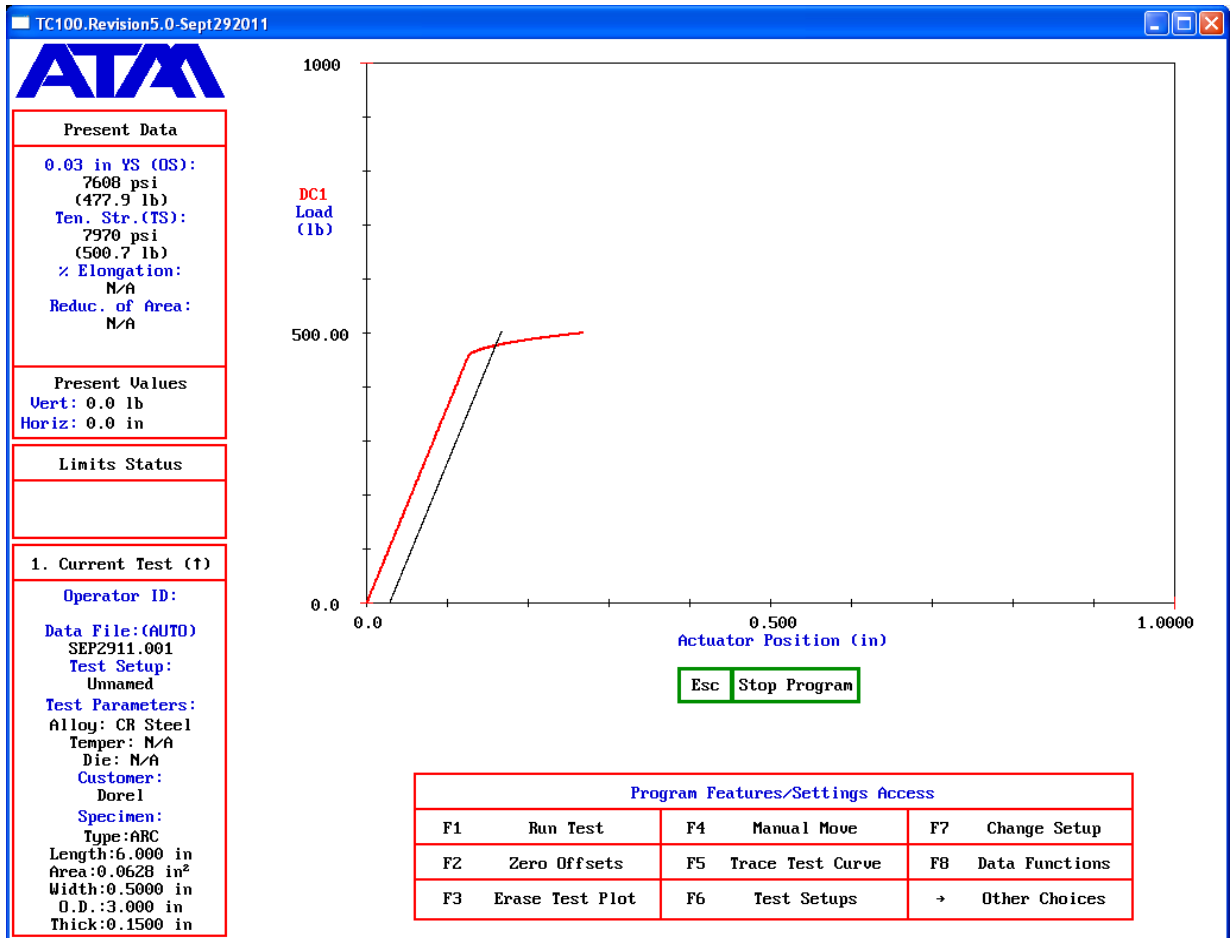


Figure 5
Model TC-100 Software Sample Test Report

Below this box, the Limits Status box will indicate if any load, stroke, strain, or time limits are being exceeded. The Current Test box shows test parameters such as testing speed, data sampling rate, specimen type, specimen dimensions, etc. Additional screens for the Current Test box are accessed using the <Up Arrow> key or clicking in the Current Test title box. The lower right portion of the screen displays the major command descriptions of the keyboard function keys F1 to F8 and the <Right Arrow> key. The <Right Arrow> key box is selected to display a second set of command descriptions for additional features.

The software design allows a high degree of Operator control of the testing configuration. The Operator can make changes to the display screen with the F7 Change Setup box with minimum disruption of the background display. Up to 1000 data sets can be stored at any given time in the directory which contains the software. The data file named TESTS.NAM contains a listing of the data sets that are available for display. The data set generated during a test can be stored to the hard drive with a filename which the Operator either enters or is automatically generated by the software. An additional archive copy can also be made of the data file to another specified folder. The resulting data files may be reloaded or erased from within the program.

Performing replicate tests is easily accomplished with a minimum number of Operator inputs. Some of the features include the following. The F2 Zero Offsets command is used to perform a software zeroing of an existing offset load resulting from changes in the test grips or test setup. F3 Erase Test Plot is used to erase the existing displayed data file with an option to store the test result before erasure. F4 Manual Move is used to activate the control box Manual Control switches. F5 Trace Curve allows the Operator to trace the curve on the screen to determine the individual data points on the curve. F6 Test Setups and F8 Data Functions allow an existing test setup or previous test to be uploaded to the software. The F7 Change Setup is used to make changes to the existing test setup include axis scales, display units, test speed, etc. In addition, an Actuator Return feature which is activated at test completion may be chosen which automatically or after an Operator key input returns the actuator piston to its position at the start of the test.

During a test, the results are displayed in Real-Time to the monitor on an X-Y plot. The current value of the individual point being displayed is updated during the test in the Present Data box. The test is stopped at a preselected end point determined by such parameters as maximum time limit, load limit, after sample breakage, % load drop after maximum value, or by pressing the <Esc> key. The values of the Tensile/Compressive Strength, % Elongation, and % RA (ie. Reduction of Area) are calculated and displayed after test completion. If an extensometer or actuator position is used for the X axis, the Yield Strength (Y.S.) may also be displayed. At test completion, the individual data points may be scrolled with the F5 Trace Test Curve function using the <Left Arrow> and <Right Arrow> keys or by inputting of the number of the data point to be displayed. Also, the data may be replotted by changing the axes scales or with different Engineering Units and the resultant data stored under a different filename.

The F8 Data Functions key may be used to display multiple data sets for comparison, storing data sets, or erasing stored data sets.

For simplifying multiple test setup requirements, up to 100 test setups may be stored using the F6 Test Setups feature. These are listed in the SETUP.NAM file. When a test setup is loaded, the current data on the screen is automatically reconfigured for the new test setup X and Y axes and Engineering Units.

Other software features allow outputting a one page test report to a Windows compatible printer. Figure 6 shows a tensile test report for the TC-100 software package. The Operator may change the graph axes scales and

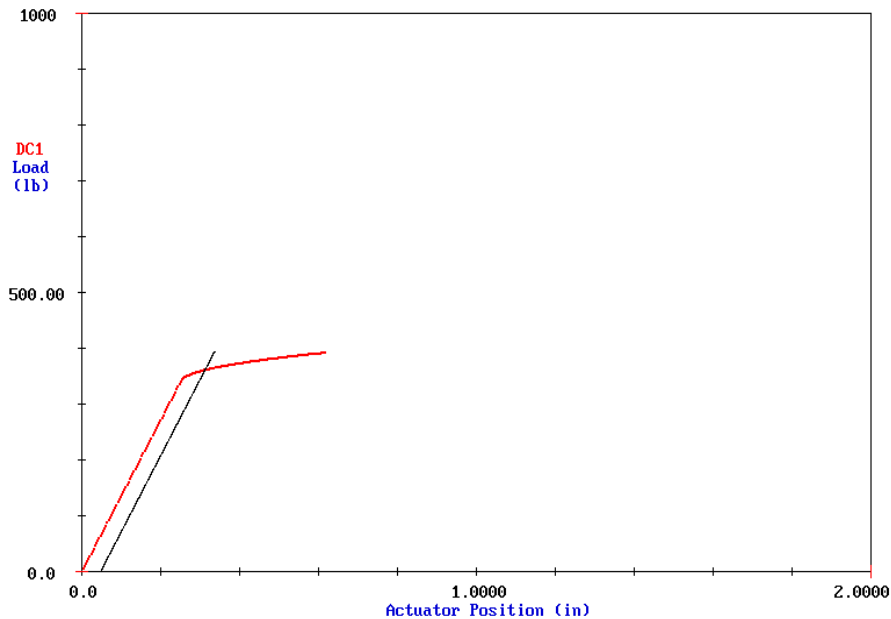
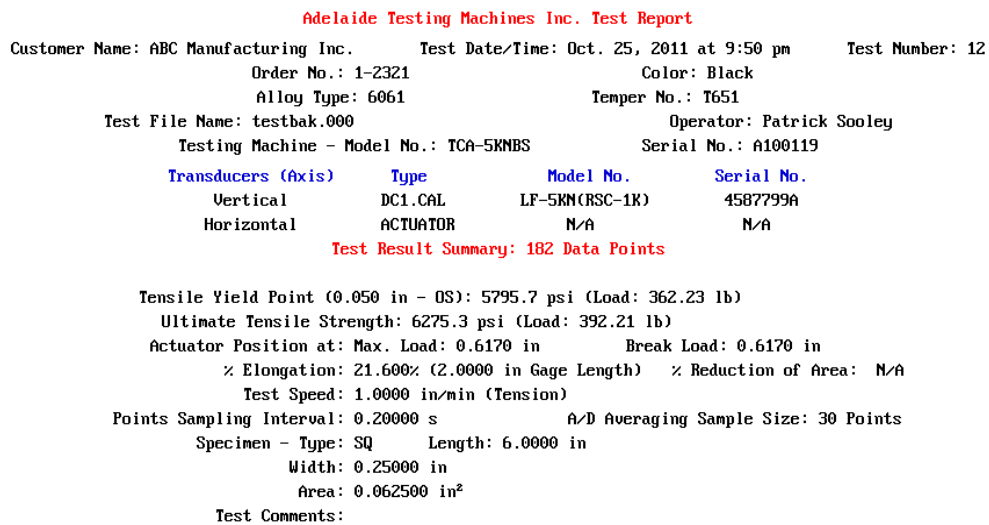


Figure 6
Model TC-100 Software Sample Test Report

view the results on the monitor before printout. The test report contains information such as the Operator settable Test Parameter descriptions which may include such parameters as Order No. and Alloy. In addition, the Test Date/Time and the Test Operator are also included in the report.

Additional software packages are available for performing creep tests and low cycle fatigue cycling tests. Existing software packages can also be customized for testing applications which can not be handled by the standard packages. Please contact Adelaide Testing Machines if you have requirements which can not be handled by our standard software packages.

6.0 Options and Accessories

Various options and accessories may be supplied with the CR Series of machines to enhance their capabilities. Some of these are listed as follows:

A. Optional 4 Channel DC Conditioner - Part No.: CRSERIES.4CHD

This amplifier board replaces the 2 Channel DC, 2 Channel AC Conditioner amplifier on the standard system. The additional 2 channels of DC conditioners are useful for systems utilizing multiple load cells and extensometers.

B. Optional Safety Shield - Part No.: CR*KN.SAF**

The safety shield package consists of two side panels and two front hinged door panels of polycarbonate sheet. The front two door panels are hinged to narrow front polycarbonate panels which are connected to the side panels. The side panels do not open. On the CR Series, the side panels are mechanically attached to the upright steel posts. The hinged doors are secured in place by two sliding bolts prior to running a test.

The package includes two hinged front door panels, side panels and all mounting hardware. A complete set must be ordered for both front and rear of the test machine if required.

C. Optional Safety Shield Door Switches - Part No.: CRSERIES.SAFSW

For this option, limit switches are installed to monitor the open/close condition of the safety doors. In the CR Series, the open door condition will stop the motor from operating in both the Manual Control operation of the machine and during the running of a test.

D. Optional Bellows Covers on Actuator (Option CRxxxxx.BSC)

For dusty environments, the CR Series machines can be supplied with a bellows cover over the actuator rod to prevent dust from coating the linear bearing guiding the actuator rod through the platen. This option is a factory installed modification and should be ordered with the system.

E. Additional Software Packages for CR Series of Testing Machines

In addition to the standard TC-100 Tensile/Compression software package supplied with the machine, a number of other software packages are available to perform a wide variety of tests. Two of these software packages are as follows:

- a) Creep Testing Software - Part No.: CR-100
- b) Low Cycle Fatigue Software (< 1 Hz.) - Part No.: FC-100

The standard packages may also be customized to include features necessary to perform unique tests on a CR Series machine. Please contact ATM if you have questions regarding the features of any of our software products or if you need custom features added.

F. Optional Load Cells

A large selection of optional load cells are available for use with the CR Series machines for special testing situations. Please contact ATM if you need assistance selecting a proper size load cell.

G. Extensometers

ATM can provide linear, diametral, biaxial, non contact laser type and elevated extensometry equipment for most applications. They are available in a wide range of deflections and temperature ranges for use with the ATM line of software and test equipment. Please contact ATM for your specific requirements for extensometry equipment.

H. Linear Transducers

Linear transducers may be provided to allow monitoring of the precise actuator movement or deflection elsewhere in a ATM or Customer supplied test fixture. Please contact us for ranges of transducers available.

I. Material Testing Grips

A wide selection of grips are available to perform tensile, compression, bending, tear tests and others. Please contact ATM with your specific requirements for grips and fixtures.

J. High Temperature Testing Ovens

ATM custom builds split tube and box type ovens for applications of the CR Series in elevated temperature testing. Please contact ATM with your specific elevated temperature testing needs.

K. Other Modifications

ATM can supply special versions of the CR Series machines for applications where the standard models will not meet the requirements. Modifications that can be supplied include increased stroke length, modified speed

ranges, extremely low speed versions for corrosion testing, increased steel post lengths, increased distance between upright steel posts, and others. Please contact ATM if you require a special modification of a CR Series machine to meet your testing requirements.